

FINAL REPORT
JULY 2000

REPORT NO. 00-13

BOX, FIBERBOARD, PACKING,
REUSABLE, COLLAPSIBLE,
FOR HIGH EXPLOSIVES,
PART NO. 7548645
MANUFACTURED BY GAYLORD
CONTAINER CORPORATION,
UNITED NATIONS (UN)
PERFORMANCE ORIENTED
PACKAGING (POP) TESTS -
RECERTIFICATION

Prepared For:
McAlester Army Ammunition Plant
McAlester, Oklahoma 74501

Distribution Unlimited



**VALIDATION ENGINEERING DIVISION
MCALESTER, OKLAHOMA 74501-9053**

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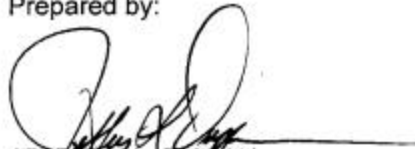
**Report No. 00-13
Box, Fiberboard, Packing, Reusable, Collapsible,
For High Explosives, Part No. 7548645,
Manufactured by Gaylord Container Corporation,
United Nations (UN) Performance Oriented
Packaging (POP) Tests - Recertification**

July 2000

ABSTRACT


The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SMAAC-DEV), was tasked by the McAlester Army Ammunition Plant (MCAAP) to conduct a UN POP Test – Recertification on Box, Fiberboard, Packing, Reusable, Collapsible, for High Explosives, Part No. 7548645, manufactured by Gaylord Container Corporation, Bogalusa, LA. The box was evaluated using UN POP requirements. No significant flaws were found during testing. The box produced by Gaylord Container Corporation can be used IAW UN POP requirements.

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REPORT NO. 00-13

**BOX, FIBERBOARD, PACKING, REUSABLE,
COLLAPSIBLE, FOR HIGH EXPLOSIVES, PART NO. 7548645,
MANUFACTURED BY GAYLORD CONTAINER CORPORATION
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TESTS, RECERTIFICATION**

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PART 1 – INTRODUCTION

A. **BACKGROUND**. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SMAAC-DEV), was tasked by the McAlester Army Ammunition Plant (MCAAP) to conduct a UN POP Test for recertification of Box, Fiberboard, Packing, Reusable, Collapsible, for High Explosives, Part No. 7548645. The box was manufactured by Gaylord Container Corporation, Bogalusa, LA.

B. **AUTHORITY**. This test was conducted IAW mission responsibilities delegated by the U.S. Army Operations and Support Command (Prov), Rock Island, IL. Effective 9 July 1993, the three-letter designator “DEV” was assigned for use when conducting UN POP tests. Effective 9 August 1994 this designation was included in the Joint Regulation AR 700-143, Performance Oriented Packaging of Hazardous Materials. Reference is made to the following:

1. Change 6, AR 740-1, 18 August 1976, Storage and Supply Activity Operation.

2. IOC-R, 10-23, Mission and Major Functions of USADAC, 7 January 1998.

C. **OBJECTIVE**. To determine if this item meets UN POP requirements.

D. **CONCLUSION**. As tested, the Box with part number 7548645 manufactured by Gaylord Container Corporation meets all UN POP requirements with no problems encountered during testing.

PART 2 – ATTENDEES

DATE PERFORMED: MAY 2000

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PART 3 -TEST PROCEDURES

The test procedures outlined herein were extracted and summarized from the Bureau of Explosives (BOE) Tariff No. BOE-6000-L, Subpart M, Section 178.600. All tests were conducted to Packing Group II requirements.

A. **DROP TEST**. Each package will be dropped onto a non-yielding surface from the height and orientations listed below. The drop height is measured as the vertical distance from the target to the lowest point on the package. The drop height for Packing Group I is 1.8 meters (5.9 feet), for Packing Group II it is 1.2 meters (3.9 feet), and Packing Group III is 0.8 meters (2.6 feet).

Packaging	No. of Tests	Drop Orientation of Samples
Steel drums, Aluminum drums, Metal Drums (other than steel or aluminum), Steel jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and jerricans, Composite packagings which are in the shape of a drum	Six ... (three for each drop)	First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on the circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.
Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are in the shape of a box.	Five... (one for each drop)	First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample).
Bags --- single-ply with a side seam	Three... (three drops per bag).	First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).
Bags --- single-ply without a side seam, or multi-ply	Three... (three drops per bag).	First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples).

B. **STACKING TEST.** The test sample must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages that might be stacked on it during transport. The minimum height of the stack, including the test sample, must be 3.0 meters (10 feet). The duration of the test must be 24 hours, except that plastic drums, jerricans, and composite packaging 6HH, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 degrees Celsius (104 degrees Fahrenheit). Alternative test methods that yield equivalent results may be used if approved by the Associate Administrator for Hazardous Materials Safety.

C. **VIBRATION TEST.** Three sample packagings, selected at random, must be filled and closed as for shipment. The three samples must be placed on a vibrating platform that has a vertical or rotary double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate. The test must be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material approximately 1.6mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

D. **PASS/FAIL CRITERIA.** A package passes the above tests if there is no rupture or leakage from any of the samples. No test sample should show any deformation that could adversely affect transportation safety or any distortion liable to reduce packaging strength.

PART 4 - UN POP TESTS

UN POP tests were conducted on the fiberboard box with part number 7548645 manufactured by Gaylord Container Corporation. Applicable tests that were conducted were as follows:

A. **VIBRATION TEST** - The vibration test was conducted on 13 June 2000 on three specimens. The tests ran for 1 hour for each specimen. Specimen A ran at 256 cycles per minute. Specimen B and C ran at 253 cycles-per-minute. After tests, inspections revealed no damage to the boxes. Figure 1 shows the setup for the vibration tests.



Figure 1. Vibration Test Setup for UN POP Testing

B. **COMPRESSION TEST**. The compression test was conducted on 13 - 14 June 2000 at 2740 pounds for 24 hours. This weight equates to a minimum stack height of 10 feet as required by UN POP test procedures. End of test inspection indicated no damage. Figure 2 shows the setup used for the compression test.



Figure 2. Compression Setup for UN POP Testing

C. **DROP TEST.** Drop tests were conducted on 14 June 2000 from 3.9 feet. The impact surface was a steel sheet covering a concrete surface that provided an unyielding surface. The drops conducted were oriented flat-bottom, flat-top, flat-long side, flat-short side, and corner. Post drop inspections showed no significant damage. Figure 4 shows the setup used for the drop tests.



Figure 4. Drop Test Setup for UN POP Testing

The above tests met the requirements of ASTM E 499-73.

UN POP TESTS (STANDARD FORM)

BOX, FIBERBOARD, PACKING, REUSABLE,
COLLAPSIBLE, FOR HIGH EXPLOSIVES, PART NO. 7548645
MANUFACTURED BY GAYLORD CONTAINER CORPORATION,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TESTS - RECERTIFICATION

U.S. Army Defense Ammunition Center
ATTN: SMAAC-DEV, 1 C Tree Road
McAlester, OK 74501-9053

918-420-8908

Jerry W. Beaver

Test Report Number: 00-13	Service Code: DEV
Product NSN: 1376-00-628-3333	Nomenclature: TNT, Type I, Flake
Shipping Name: Trinitrotoluene	UN ID Number: 209
Hazard Class: 1.1D	Packaging Group: II
Physical State: Solid	NALC/DODAC: ML51
CAA Number: N/A	EX Number: 8801519
CFR 49 Packaging Method: E-26	
Net Explosive Weight: 55 lbs	

DESCRIPTION OF PACKAGINGS TO BE TESTED
EXTERIOR CONTAINER

Exterior Container: Box, Fiberboard, Packing, Reusable, Collapsible, for High Explosives, Part Number 7548645

CFR 49 Reference Number: 173.7A

UN Code: 1A2

NSN Exterior Container: None

Specifications: 4G

Net Quantity Weight: 55 lbs. (25 kg)

Tested Gross Weight: 60 lbs. (27.3 kg)

Dimensions Interior: 17 5/8 X 14 3/8 X 7 1/8

Manufacturer: Gaylord Container Corporation, Bogalusa, LA

Year Container Manufacturer: 1998

Drawing Number(s): 19203-7548645

Cushioning: None

Closure: None

INTERMEDIATE CONTAINER

Intermediate Container Description: None

Specification Number: N/A

Container NSN: N/A

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: N/A

Number Of Intermediate Containers: N/A

UNIT CONTAINER

Unit Container Description: Plastic Liner Bag

Unit Container Specification: MIL-L-10547

Unit Container NSN: N/A

Unit Container Cushioning: None

Unit Container Closure Method: Non-Metallic Tape

Unit Container Dimensions: 29 L x 33 W

Number of Unit Containers: 1

SPECIAL NOTES

All exterior, intermediate, and unit containers must be inspected prior to use.

Inspect for physical damage, structural integrity and leakproofness of the containers.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes: DOD or commercial licensed truck and rail.

Specific Gravity: N/A

Hydrostatic Test Pressure Applied: N/A

Leakproofness Test Applied: N/A

TEST PROCEDURES

Test Conducted	Test Method	Test Results
(1) Pre-Conditioning (fiberboard)	Part 178.602	N/A
(2) Drop Test	Part 178.603(e)(1)(ii)	Pass
(3) Leakproofness Test	Part 178.604	N/A
(4) Hydrostatic Pressure Test	Part 178.605	N/A
(5) Stacking Test (2,740 lbs.)	Part 178.606(c)(1)	Pass
(6) Vibration Test	Part 178.608(b)(3)	Pass

UN POP Marking

u 4G/Y30/S/**

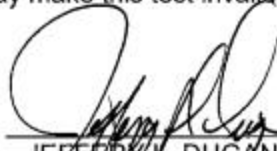
n USA/DOD/DEV

**Denotes year of manufacture

CERTIFICATION

Unless expressly stated to the contrary, we certify that all of the above applicable tests have been performed in strict conformance to CFR 49, Subpart M, Parts 178.600 – 178.608. Based on the successful test results shown above, this container is deemed suitable for transport of the hazardous material described herein, provided that maximum tested weights and quantities are not exceeded and the packaging is assembled as tested. The use of other packaging methods or components may make this test invalid.

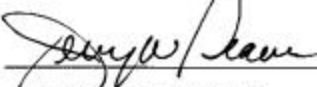
PREPARED BY:


JEFFERY L. DUGAN
Test Engineer

DATE:

7/24/2000

SUBMITTED BY:


JERRY W. BEAVER
Chief, Validation Engineering Division

DATE:

8/8/00

APPROVED BY:


JOHNNIE L. COOK
Associate Director of Engineering

DATE:

8 Aug 2000

PART 5 – SPECIAL PACKAGING INSTRUCTIONS

For special packaging instructions, see Sheet 3 of Drawing 19203-7548645.